



The construction of frontal components of objectives for microscope. Optical design

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Abstract. Some aspects of the construction of frontal components in lens systems of objectives for light microscopes are considered. The analysis of existing systems is carried out and new engineering solutions are offered. Examples of optical design are made.

1. Description.

The frontal lens is the main part of the objective itself. The main characteristic of the objective is its numerical aperture, as well as the linear field in the space of objects. The frontal lens (component) is the first after the object under investigation in the optical and optical-mechanical system of the objective. This lens is the most vulnerable in the operation of the objective, it is practically not protected from external influences of both atmospheric nature (humidity, temperature), and also from the possible influence of an aggressive environment, mechanical influences, etc. Therefore, the geometric configuration, design parameters of the frontal lens of the objective are determinate on how fully the main parameters of the lens as a whole can be realized.

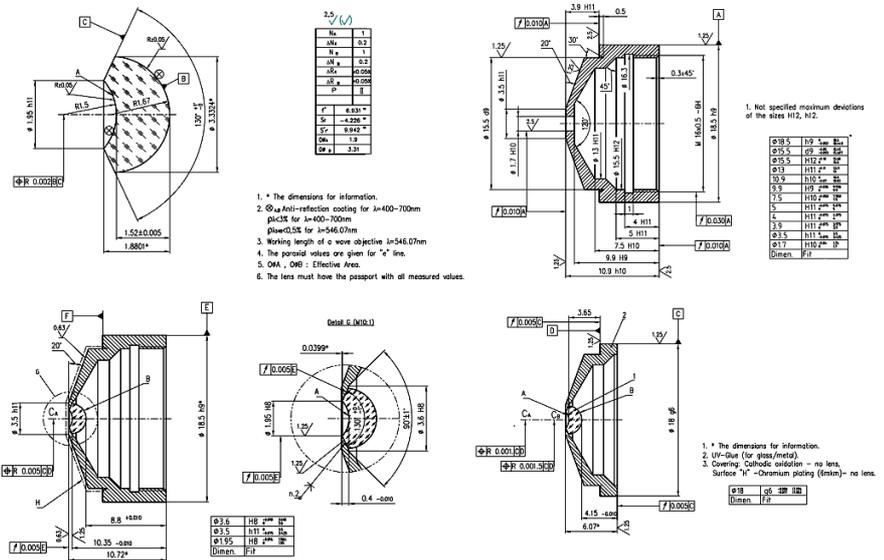


Figure 1. Typical drawings for the frontal lenses (in air) mounting design.

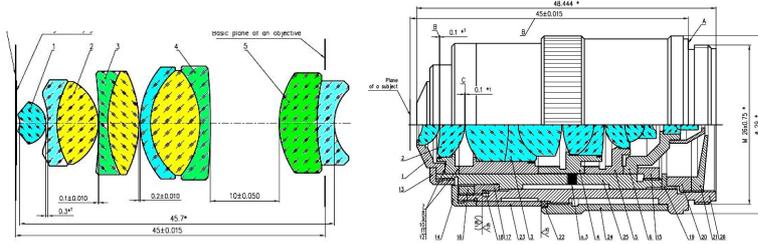


Figure 2. The results of the main stages of constructing an objective.

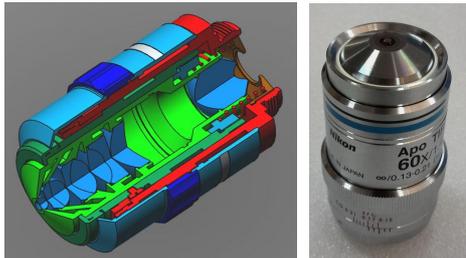


Figure 3. Two versions of 500x objective design.

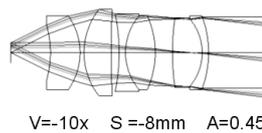


Figure 4. The design parameters of the objective for the frontal lenses control.

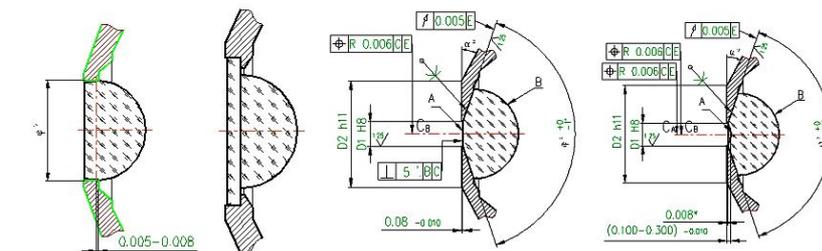


Figure 5. Types of the frontal component mounting (for immersion objectives).

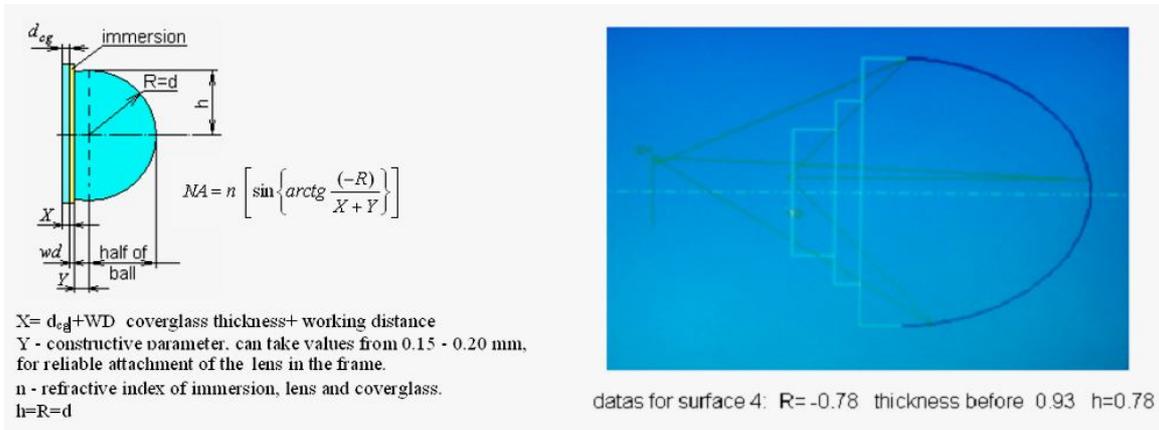


Figure 6. Geometry of the frontal lens of the oil immersion standard objective.

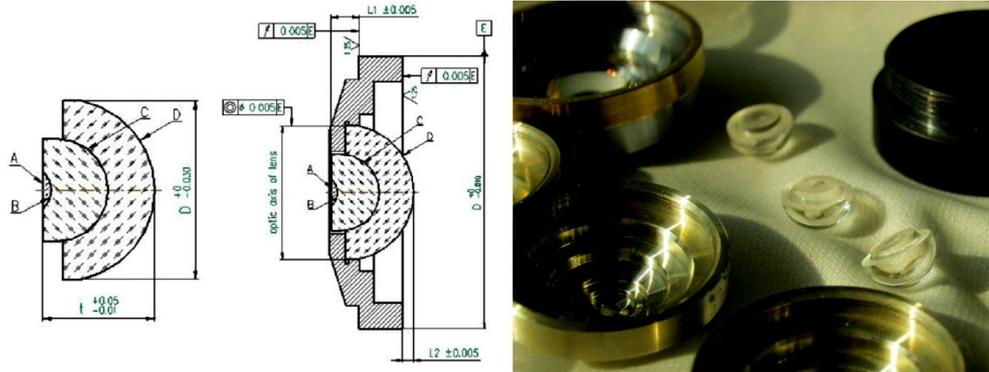


Figure 7. Three cemented lens of frontal component assembly drawing and picture.

2. Conclusion. Some suggestions and recommendations based on the experience of building frontal components of objectives for light microscopes have been proposed. It is shown that the frontal components are the main optical-mechanical part of the objective for the microscope, both as working in the air and using immersion.

A discussion was made about some possible mistakes in the optical calculation and mechanical design of the frontal components of the lenses. Some design solutions for the frontal components of high-aperture objectives for microscopes are proposed.